LIST OF CLAIMS

1. (Currently Amended) An olefin polymer having the ratio of number average molecular weight and weight average molecular weight (Mw/Mn) of not more ~~less~~ than 1.5, selected from the group consisting of:

~~polyethylene having number average molecular weight of not less than 110,000,~~

~~high density polyethylene having number average molecular weight of not less than 110,000,~~

~~linear low density polyethylene having number average molecular weight of not less than 110,000,~~

polypropylene having number average molecular weight of not less than 500, melting point of not lower than 70°C and a racemic diad (R), as measured by ^{13}C-NMR, of not less than 0.85,

polybutene having number average molecular weight of not less than 500, melting point of not lower than 70°C and a racemic diad (R), as measured by ^{13}C-NMR, of not less than 0.85,

~~a copolymer of ethylene and at least one olefin selected from olefins of 3 to 20 carbon atoms, dienes and cycloolefins, and having number average molecular weight of not less than 500,~~ and

a copolymer of propylene, and at least one olefin selected from the group consisting of olefins of 4 to 20 carbon atoms, dienes and cycloolefins having number average molecular weight of not less than 500.

07/07/2004

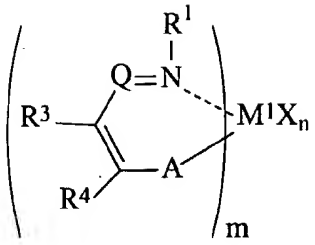
2-26. (Canceled)

2
27. (Previously Presented) A molded product comprising the olefin polymer of claim 1.

28. (Canceled)

07-09-2004
3
29. (Currently Amended) A process for preparing an olefin polymer, comprising polymerizing propylene or butene or copolymerizing propylene and at least one olefin selected from the group consisting of olefins of 4 to 20 carbon atoms, dienes, and cycloolefins ~~an olefin of 2 to 20 carbon atoms~~ in the presence of an olefin polymerization catalyst comprising a

transition metal compound which is represented by the following formula (II-a) or (II-b) and has the following properties: (i) in a ß-agostic structure of a cationic complex wherein one of X in the formula (II-a) or (II-b) is replaced with a n-propyl group, said structure being measured by a density functional method, the distance between the heteroatom, which has no direct bond to the central metal M and is nearest to the central metal M and is selected from the group consisting of halogen, nitrogen, oxygen, phosphorus, sulfur and selenium, and hydrogen at the ß-position is not more than 3.0 Å; and (ii) the electrostatic energy is not more than 10 KJ/mol;



Formula (I I - a)

wherein M^1 is titanium atom,

m is an integer of 1 to 5 and the sum of m and n is a number satisfying a valence of M^1,

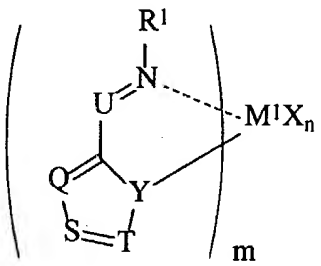
Q is a nitrogen atom or a carbon atom having a substituent R^2,

A is an oxygen atom, a sulfur atom, a selenium atom or a nitrogen atom having a substituent R^5,

R^1 is a hydrocarbon group having one or more fluorine atoms or a hydrocarbon group having one or more fluorine-containing groups,

R^2 to R^5 may be the same or different and are each a hydrogen atom, a halogen atom, a hydrocarbon group, a hydrocarbon-substituted silyl group, an oxygen-containing group, a nitrogen-containing group, a sulfur-containing group, a boron-containing group, an aluminum-containing group, a phosphorus-containing group, a halogen containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group or a tin-containing group, two or more of R^2 to R^5 may be bonded to form a ring, and when m is 2 or greater, R^1s, R^2s, R^3s, R^4s and R^5s may be the same or different, and one group of R^2 to R^5 contained in one ligand and one group of R^2 to R^5 contained in other ligands may be bonded,

and X is an oxygen atom, a hydrogen atom, a halogen atom, a hydrocarbon group, an oxygen-containing group, a sulfur-containing group, a nitrogen-containing group, a boron-containing group, an aluminum-containing group, a phosphorus-containing group, a halogen-containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group or a tin-containing group, and when n is 2 or greater, plural groups indicated by X may be the same or different, and plural groups indicated by X may be bonded to form a ring;



Formula (II-b)

wherein M^1 is titanium atom,

m is an integer of 1 to 5 and the sum of m and n is a number satisfying a valence of M^1,

Y is a nitrogen atom or a phosphorus atom,

U is a carbon atom having a substituent R^6, a nitrogen atom or a phosphorus atom,

Q is a carbon atom having a substituent R^7, a nitrogen atom or a phosphorus atom,

S is a carbon atom having a substituent R^8, a nitrogen atom or a phosphorus atom,

T is a carbon atom having a substituent R^9, a nitrogen atom or a phosphorus atom,

R^1 is a hydrocarbon group having one or more fluorine atoms or a hydrocarbon group having one or more fluorine-containing groups ~~group~~,

R^6 to R^9 may be the same or different and are each a hydrogen atom, a halogen atom, a hydrocarbon group, a hydrocarbon-substituted silyl group, an oxygen-containing group, a nitrogen-containing group, a sulfur-containing group, a boron-containing group, an aluminum-containing group, a phosphorus-containing group, a halogen containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group or a tin-containing group, two or more of R^6 to R^9 may be bonded to form a ring, and when m is 2 or greater, R^1s, R^6s, R^7s, R^8s and R^9s may be the same or different, and one group of R^6 to R^9 contained in one ligand and one group of R^6 to R^9 contained in other ligands may be bonded,

and X is an oxygen atom, a hydrogen atom, a halogen atom, a hydrocarbon group, an oxygen-containing group, a sulfur-containing group, a nitrogen-containing group, a boron-containing group, an aluminum-containing group, a phosphorus-containing group, a halogen-containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group or a tin-containing group, and when n is 2 or greater, plural groups indicated by X may be the same or different, and plural groups indicated by X may be

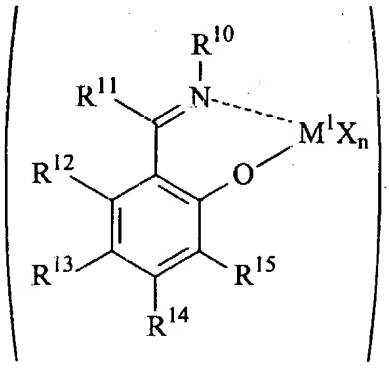
bonded to form a ring.

30. (Currently Amended) A process for preparing an olefin polymer, comprising polymerizing propylene or butene or copolymerizing propylene and at least one olefin selected from the group consisting of olefins of 4 to 20 carbon atoms, dienes and cycloolefins ~~an olefin of 2 to 20 carbon atoms~~ in the presence of an olefin polymerization catalyst comprising a transition metal compound which is represented by formula (II-a) or (II-b) in claim 29, wherein R^1 is an aromatic hydrocarbon group, an aliphatic hydrocarbon group or an alicyclic hydrocarbon group, wherein said aromatic hydrocarbon group is a phenyl group having, at least one position of the 2-position and the 6-position, when the position of the carbon atom bonded to nitrogen is the 1-position, one or more substituents selected from a fluorine atom and a fluorine-containing group, or a phenyl group having, at least one position of the 3-position, the 4-position and the 5-position, at least one substituent selected from a fluorine-containing group having one carbon atom and not more than two fluorine atoms and a fluorine-containing group having two or more carbon atoms, an aromatic hydrocarbon group other than a phenyl group having at least one substituent selected from a fluorine atom and a fluorine-containing group, an aliphatic hydrocarbon group having at least one substituent selected from a fluorine atom and a fluorine-containing group, or an alicyclic hydrocarbon group having

at least one substituent selected from a fluorine atom and a fluorine-containing group.

31. (Canceled)

32. (Currently Amended) A process for preparing an olefin polymer, comprising polymerizing propylene or butene or copolymerizing propylene and at least one olefin selected from the group consisting of olefins of 4 to 20 carbon atoms, dienes and cycloolefins ~~an olefin of 2 to 20 carbon atoms~~ in the presence of an olefin polymerization catalyst comprising a transition metal compound which is represented by the following formula (III);



...(III)

wherein M^1 is titanium atom,

m is 1 or 2 and the sum of m and n is a number satisfying a valence of M^1,

R^{10} is an aromatic hydrocarbon group, an aliphatic hydrocarbon group or an alicyclic hydrocarbon group, when R^{10} is a phenyl group and the position of the carbon atom bonded to nitrogen is the 1-

position, the phenyl group has, at least one position of the 2-position and the 6-position, one or more substituents selected from a fluorine and a fluorine-containing group, or has, at least one position of the 3-position, the 4-position and the 5-position, at least one substituent selected from a fluorine-containing group having one carbon atom and not more that two fluorine atoms and a fluorine-containing group having two or more carbon atoms, and when R^{10} is an aromatic hydrocarbon group other than a phenyl group, an aliphatic hydrocarbon group or an alicyclic group, the group has at least one substituent selected from a fluorine and a fluorine-containing group,

R^{11} to R^{14} may be the same or different and are each a hydrogen atom, a halogen atom, a halogen-containing group, a hydrocarbon group, a hydrocarbon-substituted silyl group, an oxygen-containing group, a nitrogen-containing group or a sulfur-containing group,

R^{15} is a halogen atom, a halogen-containing group, a hydrocarbon group or a hydrocarbon-substituted silyl group, and

X is an oxygen atom, a hydrogen atom, a halogen atom, a hydrocarbon group, an oxygen-containing group, a sulfur-containing group, a nitrogen-containing group, a boron-containing group, an aluminum-containing group, a phosphorus-containing group, a halogen-containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group or a tin-containing group, and when n is 2 or greater, plural groups indicated by X may

be the same or different, and plural groups indicated by X may be bonded to form a ring.

33. (Canceled)

34. (Canceled)

35. (Withdrawn and Currently Amended) A process for preparing an olefin polymer, comprising polymerizing propylene or butene or copolymerizing propylene and at least one olefin selected from olefins of 4 to 20 carbon atoms, dienes and cycloolefins ~~an olefin of 2 to 20 carbon atoms~~ in the presence of an olefin polymerization catalyst comprising a transition metal compound to prepare a polymer and then bringing the polymer into contact with a functional group-containing compound to prepare an olefin polymer having a functional group at the terminal, said transition metal compound being selected from the group consisting of

Canceled

a transition metal compound which is represented by the following formula (I) and has properties that, in a β-agostic structure of a cationic complex wherein one of X in the formula (I) is replaced with a n-propyl group, said structure being measured by a density functional method, the distance between the heteroatom, which has no direct bond to the central metal M and is nearest to

the central metal M, and hydrogen at the β-position is not more than 3.0 Å and the electrostatic energy is not more than 10kJ/mol,

$$L_mMX_n \qquad (I)$$

wherein M is a transition metal atom selected from Group 3 to Group 11 of the periodic table,

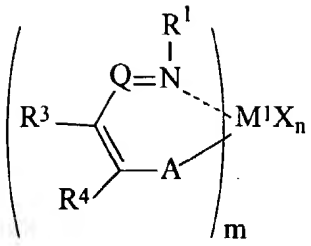
m is an integer of 1 to 5,

n is a number satisfying a valence of M,

L is a ligand coordinated to the central metal M and is a ligand having a heteroatom which has no direct bond to the central metal M, and

X is an oxygen atom, a hydrogen atom, a halogen atom, a hydrocarbon group, an oxygen-containing group, a sulfur-containing group, a nitrogen-containing group, a boron-containing group, an aluminum-containing group, a phosphorus-containing group, a halogen-containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group or a tin-containing group, and when n is 2 or greater, plural groups indicated by X my be the same or different, and plural groups indicated by X may be bonded to form a ring:

a transition metal compound which is represented by the following formula (II-a)



Formula (I I - a)

(II-a)

wherein M^1 is a transition metal atom selected from Group 3 to Group 11 of the periodic table,

m is an integer of 1 to 5,

Q is a nitrogen atom or a carbon atom having a substituent R^2,

A is an oxygen atom, a sulfur atom, a selenium atom or a nitrogen atom having a substituent R^5,

R^1 is an aromatic hydrocarbon group, an aliphatic hydrocarbon group or an alicyclic hydrocarbon group, selected from a phenyl group having, at least one position of the 2-position and the 6-position, when the position of the carbon atom bonded to nitrogen is the 1-position, one or more substituents selected from a halogen atom and a halogen-containing group, or a phenyl group having, at least one position of the 3-position, the 4-position and the 5-position, and least one substituent selected from a fluorine-containing group having one carbon atom and not more than two fluorine atoms, a fluorine-containing group having two or more carbon atoms, a chlorine atom, a bromine atom, an iodine atom, a

chlorine-containing group, a bromine-containing group and an iodine-containing group, an aromatic hydrocarbon group other than a phenyl group having at least one substituent selected from a halogen atom and a halogen-containing group, an aliphatic hydrocarbon group having at least one substituent selected from a halogen atom and a halogen-containing group, or an alicyclic hydrocarbon group having at least one substituent selected from a halogen atom and a halogen-containing group,

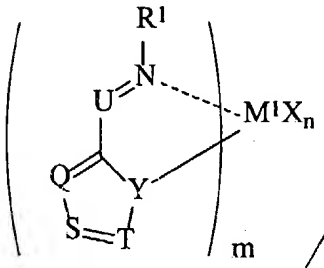
R^2 to R^5 may be the same or different and are each a hydrogen atom, a halogen atom, a hydrocarbon group, a hydrocarbon-substituted silyl group, an oxygen-containing group, a nitrogen-containing group, a sulfur-containing group, a boron-containing group, an aluminum-containing group, a phosphorus-containing group, a halogen-containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group, or a tin-containing group, two or more of R^2 to R^5 may be bonded to form a ring, and when m is 2 or greater, R^1s, R^2s, R^3s, R^4s, and R^5s may be the same or different, and one group of R^2 to R^5 contained in one ligand and one group of R^2 to R^5 contained in other ligands may be bonded,

n is a number satisfying a valence of M^1, and

X is an oxygen atom, a hydrogen atom, a halogen atom, a hydrocarbon group, an oxygen-containing group, a sulfur-containing group, a nitrogen-containing group, a boron-containing group, an

aluminum-containing group, a phosphorus-containing group, a halogen-containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group or a tin-containing group, and when n is 2 or greater, plural groups indicated by X may be the same or different, and plural groups indicated by X may be bonded to form a ring;

a transition metal compound which is represented by the following formula (II-b)



Formula (II-b)

(II-b)

wherein M^1 is a transition metal atom selected from Group 3 to Group 11 of the periodic table,

m is an integer of 1 to 5,

Y is a nitrogen atom or a phosphorus atom,

U is a carbon atom having a substituent R^6, a nitrogen atom or a phosphorus atom,

Q is a carbon atom having a substituent R^7, a nitrogen atom or a phosphorus atom,

S is a carbon atom having a substituent R^8, a nitrogen atom or a phosphorus atom,

T is a carbon atom having a substituent R^9, a nitrogen atom or a phosphorous atom,

R^1 is an aromatic hydrocarbon group, an aliphatic hydrocarbon group or an alicyclic hydrocarbon group, selected from a phenyl group having, at least one position of the 2-position and the 6-position, when the position of the carbon atom bonded to nitrogen is the 1-position, one or more substituents selected from a halogen atom and a halogen-containing group, or a phenyl group having, at least one position of the 3-position, the 4-position and the 5-position, at least one substituent selected from a fluorine-containing group having one carbon atom and not more than two fluorine atoms, a fluorine-containing group having two or more carbon atoms, a chlorine atom, a bromine atom, an iodine atom, a chlorine-containing group, a bromine-containing group and an iodine-containing group, an aromatic hydrocarbon group other than a phenyl group having at least one substituent selected from a halogen atom and a halogen-containing group, an aliphatic hydrocarbon group having at least one substituent selected from a halogen atom and a halogen-containing group, or an alicyclic hydrocarbon group having at least one substituent selected from a halogen atom and a halogen-containing group,

Canceled

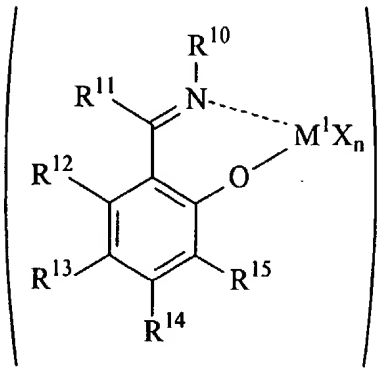
R^6 to R^9 may be the same or different and are each a hydrogen atom, a halogen atom, a hydrocarbon group, a hydrocarbon-substituted silyl group, an oxygen-containing group, a nitrogen-

containing group, a sulfur-containing group, a boron-containing group, an aluminum-containing group, a phosphorus-containing group, a halogen-containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group or a tin-containing group, two or more of R^6 to R^9 may be bonded to form a ring, and when m is 2 or greater, R^1s, R^6s, R^7, R^8s and R^9s may be the same or different, and one group of R^6 to R^9 contained in one ligand and one group of R^6 to R^9 contained in other ligands may be bonded,

n is a number satisfying a valence of M^1, and

X is an oxygen atom a hydrogen atom, a halogen atom, a hydrocarbon group, an oxygen-containing group, a sulfur-containing group, a nitrogen-containing group, a boron-containing group, an aluminum-containing group, a phosphorus-containing group, a halogen-containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group or a tin-containing group, and when n is 2 or greater, plural groups indicated by X may be the same or different, and plural groups indicated by X may be bonded to form a ring; and

a transition metal compound which is represented by the following formula (III)



...(III)

wherein M^1 is a transition metal atom selected from Group 4 to Group 5 of the periodic table,

m is 1 or 2,

R^{10} is an aromatic hydrocarbon group, an aliphatic hydrocarbon group or an alicyclic hydrocarbon group, when R^{10} is a phenyl group and the position of the carbon atom bonded to nitrogen is the 1-position, this phenyl group has, at least one position of the 2-position and the 6-position, one or more substituents selected from a heteroatom and a heteroatom-containing group, or has, at least one position of the 3-position, the 4-position and the 5-position, at least one substituent selected from a heteroatom other than a fluorine atom, a fluorine-containing group having one carbon atom and not more than two fluorine atoms, a fluorine-containing group having two or more carbon atoms, and a group containing a heteroatom other than a fluorine atom, and when R^{10} is an aromatic hydrocarbon group other than a phenyl group, an aliphatic hydrocarbon group or an alicyclic group, this group has at least

Canceled

one substituent selected from a heteroatom and a heteroatom-containing group,

R^{11} to R^{14} may be the same or different and are each a hydrogen atom, a halogen atom, a halogen-containing group, a hydrocarbon group, a hydrocarbon-substituted silyl group, an oxygen-containing group, a nitrogen-containing group or a sulfur-containing group,

R^{15} is a halogen atom, a halogen-containing group, a hydrocarbon group or a hydrocarbon-substituted silyl group,

n is a number satisfying a valence of M, and

X is an oxygen atom, a hydrogen atom, a halogen atom, a hydrocarbon group, an oxygen-containing group, a sulfur-containing group, a nitrogen-containing group, a boron-containing group, an aluminum-containing group, a phosphorus-containing group, a halogen-containing group, a heterocyclic compound residue, a silicon-containing group, a germanium-containing group or a tin-containing group, and when n is 2 or greater, plural groups indicated by X may be the same or different, and plural groups indicated by X may be bonded to form a ring.

Canceled

36-44. (Canceled)

~~45~~. 6 (Previously Presented) The process of claims ~~29~~, ~~30~~ 3 and 4 ~~32~~, 5 wherein the hydrocarbon group is selected from the group consisting of alkyl, C_{3-30} cycloalkyl, alkenyl, arylalkyl, aryl and

C_{1-20} halogenated hydrocarbons wherein at least one hydrogen is replaced with a halogen.

~~46.~~ 7 (Previously Presented) The process of claims ~~29~~ 3 and ~~32~~, 5 wherein the oxygen containing group is selected from the group consisting of hydroxy, alkoxy, aryloxy, arylalkoxy, acetoxy and carbonyl group.

~~47.~~ 8 (Previously Presented) The process of claims ~~29~~ 3 and ~~32~~, 5 wherein the nitrogen containing group is selected from the group consisting of amino, alkylamino, arylamino and alkylarylamino.

~~48.~~ 9 (Previously Presented) The process of claims ~~29~~ 3 and ~~32~~, 5 wherein the sulfur containing group is selected from the group consisting of sulfonato groups, sulfinato groups, alkylthio groups and arylthio groups.

~~49.~~ 10 (Previously Presented) The process of claims ~~29~~ 3 and ~~32~~, 5 wherein the boron containing group is BR_4 wherein R is hydrogen, halogen, an alkyl group or an optionally substituted aryl group.

~~50.~~ 11 (Previously Presented) The process of claims ~~29~~ 3 and ~~32~~, 5 wherein the aluminum containing group is AlR_4 wherein R is

hydrogen, halogen, an alkyl group or an optionally substituted aryl group.

12 3 5
~~51~~. (Previously Presented) The process of claims ~~29~~ and ~~32~~, wherein the phosphorus containing group is selected from the group consisting of trialkylphosphine, triarylphosphine, phosphite, phosphonic acid and phosphinic acid.

13 3 4 5
~~52~~. (Previously Presented) The process of claims ~~29~~, ~~30~~ and ~~32~~, wherein the halogen containing group is selected from the group consisting of fluorine containing groups, chlorine containing groups and iodine containing groups.

14 3 5
~~53~~. (Previously Presented) The process of claims ~~29~~ and ~~32~~, wherein the heterocyclic compound residue is selected from the group consisting of optionally substituted residues of nitrogen containing groups, optionally substituted residues of oxygen containing groups and optionally substituted residues of sulfur containing groups, wherein the substituent is an C_{1-30} alkyl group or alkoxy group.

15 3 5
~~54~~. (Previously Presented) The process of claims ~~29~~ and ~~32~~, wherein the silicon containing group is selected from the group consisting of hydrocarbon-substituted silyl groups, hydrocarbon-

substituted silyl ether groups, silicon-substituted alkyl groups and silicon-substituted aryl groups.

~~55.~~ 16. (Previously Presented) The process of claims ~~29~~ 3 and ~~32~~ 5, wherein the germanium containing group is selected from the group consisting of hydrocarbon-substituted germanium groups, hydrocarbon-substituted germanium ether groups, germanium-substituted alkyl groups and germanium-substituted aryl groups.

~~56.~~ 17. (Previously Presented) The process of claims ~~29~~ 3 and ~~32~~ 5, wherein the tin containing group is selected from the group consisting of hydrocarbon-substituted tin groups, hydrocarbon-substituted tin ether groups, tin-substituted alkyl groups and tin-substituted aryl groups.